United States of America

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE[1]

Agenda Item 1.26: to consider the provisions, under which earth stations located on board vessels, could operate in fixed satellite networks, taking into account the ITU-R studies in response to Resolution **82**;

Background Information: Resolves 4 of Resolution **82** states that until WRC-03 takes further action, agreement between the administrations licensing Earth stations on board vessels (ESVs) and affected administrations should be reached on a bilateral or multilateral basis, in accordance with the guidelines in its Annexes 1 and 2. ESVs have been operating for over 10 years under national provisions (No. **4.4** of the Radio Regulations).

Several actions have taken place in ITU-R Study Groups to develop Recommendations or CPM text related to this agenda item. These include the development of:

a. Working Party 4A Recommendation on the Characteristics of ESVs, including those to be used for sharing studies at 6 GHz and 14 GHz;

b. a JWP 4-9S Draft New Recommendation identifying the 5 925-6 425 MHz and 14-14.5 GHz bands as suitable for ESV operations (Earth-to-space);

c. several Draft New Recommendations in Joint Working Party 4-9S on methods to be used for achieving agreement with fixed stations when ESVs are in motion near the shore, including determination of a distance beyond which no agreement is necessary;

d. draft CPM text which includes example footnotes to the Table of Frequency Allocations at 5 925-6 425 MHz and 14-14.5 GHz and two examples of a revised Resolution **82**. The first example footnote would make compliance with the modified Resolution **82** mandatory, the second example would require "all practical steps" to comply with the Resolution. Similarly, the first of the two modified example Resolution 82s would make the contact procedures mandatory, the second example Resolution **82** does not.

As administrations may assign frequencies for ESVs pursuant to No. **4.4** of the Radio Regulations and ESV systems are mobile, it is appropriate to inform administrations operating systems in accordance with the Radio Regulations of the operation of ESVs and to allow them to take steps to prevent the possibility of harmful interference from ESV systems to their systems.

In accordance with the 1982 United Nations Convention on the Law of the Sea (UNCLOS, 1982), the point to measure distances identified in USA / /5 Resolution **82** is the "low water mark" defined as the baseline from which the territorial sea is measured.

The proposed footnote and revisions of Resolution **82** provide for advance notice of the operation of ESV systems and provide operational procedures to use with administrations whose systems might be

[1] This is a revised version of the original draft U.S. proposal on this agenda item. (September 16, 2002)

affected by such ESV use. The bilateral procedure in the proposed revision of Resolution **82** will allow administrations to reach agreement on the use of ESVs so that other systems operating in accordance with the Radio Regulations are protected. Additionally, the proposed definition of ESVs is intended to clarify the status of ESVs operating within networks in the fixed-satellite service (FSS), and a proposed new footnote is intended to ensure the protection of adjacent satellites when ESVs are operating within FSS networks.

Proposal:

ARTICLE 1

Terms and definitions

SECTION IV – RADIO STATIONS AND SYSTEMS

USA/ /1 ADD

1.68 bis *earth station on board a vessel:* an earth station located on board a vessel operating in certain bands of the fixed-satellite service and intended to be used while in motion or during halts at unspecified points.

Reasons: Adding this definition will ensure that the class of station and the category of allocation of both earth and space stations will be matched to each other.

ARTICLE 5

Frequency allocations

USA/ /2 MOD

5 925 – 6 700 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 925 – 6 700	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 5.149 5.440 5.458 **ADD** <u>5.ESV</u>	

Reasons: Footnote 5.ESV is added to provide guidance to administrations wishing to allow the use of earth stations on board vessels in the bands 5 925-6 425 MHz and 14-14.5 GHz while providing protection to existing users of the bands.

USA/ /3 MOD

14-14.5 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
14-14.25	FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space research 5.505 **ADD** 5.ESV	
14.25-14.3	FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space research 5.505 5.508 5.509 **ADD** 5.ESV	
14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radionavigation-satellite **ADD** 5.ESV	14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radionavigation-satellite **ADD** 5.ESV	14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radionavigation-satellite **ADD** 5.ESV
14.4-14.47	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space research (space-to-Earth) **ADD** 5.ESV	
14.47-14.5	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radio astronomy 5.149 **ADD** 5.ESV	

Reasons: Footnote 5.ESV is added to provide guidance to administrations wishing to allow the use of earth stations on board vessels in the bands 5 925-6 425 MHz and 14-14.5 GHz while providing protection to existing users of the bands.

USA/ /4 ADD

5.ESV Administrations operating earth-stations on board vessels in the bands 5 925-6 425 MHz and 14-14.5 GHz shall take all practicable steps to comply with Resolution **82 (WRC-03)**. Such use shall not cause harmful interference to, claim protection from, or otherwise impose constraints on the operation or development of other radio services operating in the band 5 925-6 425 MHz and 14-14.5 GHz.

Reasons: To provide guidance to administrations wishing to allow the use of earth stations on board vessels in the bands 5 925-6 425 MHz and 14-14.5 GHz and provide protection to existing users of the bands.

USA/ /5 MOD

RESOLUTION 82 (WRC-~~200~~03)

Provisions relating to earth stations located on board vessels ~~which~~ operate**ing** with fixed-satellite service networks in the bands ~~3 700-4 200~~ 5 925-6 425 MHz and ~~5 925-6 425 MHz~~ 14.0-14.5 GHz

The World Radiocommunication Conference (~~Istanbul, 2000~~ Geneva, 2003),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) ~~that the technology exists that enables earth stations on board vessels (ESVs) to use fixed-satellite service (FSS) networks operating in the 3 700-4 200 MHz and 5 925-6 425 MHz bands;~~ that ESVs are currently operating through fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz, 5 925-6 425 MHz, 10.7-12.75 GHz, and 14.0-14.5 GHz;

c) that ESVs have the potential to cause unacceptable interference to other services in the ~~band~~ 5 925-6 425 MHz and 14.0-14.5 GHz (Earth-to-space) bands;

d) that ESVs operating in these bands require considerably less than the full bandwidth in the FSS allocation and only a portion of the visible geostationary arc;

~~*e)* that there are a limited number of geostationary FSS systems that have global coverage;~~

~~*f)*~~*e)* that the number of vessels equipped with ESVs may be such that the procedures could ~~as to~~ place a heavy processing burden on some administrations, especially those in developing countries;

~~*g)*~~*f)* that in order to ensure the protection and future growth of other services, ESVs ~~shall~~ should operate with requisite technical and operational constraints;

~~*h)*~~*g)* that, ~~based on appropriate assumptions,~~ a minimum distance ~~can be calculated~~has been identified beyond which an ESV will not have the potential to cause unacceptable interference to other services in th~~e~~is bands 5 925 -6 425 MHz and 14 – 14.5 GHz,

noting

a) that ESVs may be assigned frequencies to operate in FSS networks in the bands 3 700-4 200 MHz, 5 925-6 425 MHz, 10.7-12.75 GHz, and 14-14.5 GHz ~~under~~ pursuant to No. **4.4** of the Radio Regulations and shall not claim protection from, nor cause harmful interference to, other services having allocations in these bands;

b) ~~that there is no need for new regulatory procedures~~ that existing regulatory procedures provide for ESVs operating at specified fixed points,

recognizing

~~*a)* that progress has been made within ITU-R in determining the technical and operational provisions under which ESVs could operate;~~ that the reference to the distances in resolves 2 is solely for the purpose of facilitating avoidance of radio interference and does not confer any territorial rights on Administrations.

~~b) that further studies are needed,~~

resolves

1 that any transmissions from ESVs, except those operating pursuant to No. **4.4** of the Radio Regulations, within the distances identified in *resolves* 2 of this resolution, be based upon the prior agreement of the concerned administrations; ~~to invite ITU-R to continue to study, as a matter of urgency, the regulatory, technical and operational constraints to be applied to ESV operations, having regard to the provisional guidelines for ESV use in Annex 1 and the provisional technical guidelines given in Annex 2and, in particular, to determine the appropriate value for the minimum distance from ESV stations beyond which these stations are assumed not to have the potential to cause unacceptable interference to stations of other services of any administration and beyond which no coordination would be required;~~

2 ~~to invite ITU-R, as a matter of urgency:~~

~~– to develop Recommendations on methods for coordination between terrestrial services and ESVs;~~

~~– to study the feasibility of mitigation techniques, such as various frequency arrangements or dual-band systems, as a way to avoid the need for detailed coordination of ESVs without constraining existing services;~~

~~– to study, as a complement to the 3 700-4 200 MHz and 5 925-6 425 MHz bands, the use of other FSS allocations for ESVs transmitting in the 6 GHz and 14 GHz bands;~~

that the minimum distances from the baseline ("low water mark", as defined by the United Nations Convention on the Law of the Sea, 1982 (UNCLOS, 1982)) beyond which ESV stations are assumed not to have the potential to cause unacceptable interference to stations of other services of any administration and beyond which no agreement is necessary, are 300 km for the 5 925-6 425 MHz band and 125 km for the 14.0-14.5 GHz band;

~~3 to invite WRC-03 to assess, in the light of these studies, the provisions under which ESVs could operate in FSS networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, without causing~~

~~unacceptable interference to radiocommunication services operating in accordance with the Radio Regulations;~~

~~4 that, until a decision is adopted for ESVs by WRC-03, agreement between the administrations licensing ESVs and affected administrations should be reached on a bilateral or multilateral basis, in accordance with the guidelines in Annexes 1 and 2;~~

~~5 that, until a decision is adopted for ESVs by WRC-03, administrations licensing ESVs that enter into bilateral or multilateral agreements under resolves 4 above should ensure that, as part of the licensing process, ESVs operate in compliance with such agreements, taking into consideration the interests of concerned neighbouring countries;~~

3 that operation of ESVs follow the procedures in Annex 1 and include the typical characteristics listed in Annex 2.

encourages concerned administrations

to cooperate with administrations ~~which~~ that license ESVs ~~while~~ and seek~~ing~~ agreement under ~~resolves 4,~~ the provisions of Annex 1,

encourages ESV licensing administrations

to consider registering their ESV frequency assignments in the Master International Frequency Register, for information purposes only,

~~*urges all administrations*~~

~~to participate actively in the above-mentioned studies by submitting contributions,~~

instructs the Secretary-General

to bring this resolution to the attention of the Secretary-General of the International Maritime Organization ~~and to invite IMO to participate in the work on this issue.~~

USA/ /6 MOD

ANNEX 1 TO RESOLUTION 82 (WRC-~~20~~03)

~~**Provisional guidelines**~~ **Operational procedures for ESV use**

~~1 The administration that issues the licence for the use of ESVs in these bands (licensing administration) shall ensure that such stations do not cause unacceptable interference to the services of other concerned administrations.~~

~~2 Operators of ESVs shall comply with the technical guidelines listed in Annex 2 and/or those agreed by the licensing and concerned administrations.~~

~~3 ESVs shall not claim protection from transmissions of other services operating in accordance with the Radio Regulations.~~

~~4 Any transmissions from ESVs within an agreed distance, as identified in resolves 1 of this Resolution, shall be based upon the prior agreement of the concerned administration.~~

~~5 Administrations which issue ESV licences shall ensure that ESV operators endeavour to provide the necessary assistance to the concerned administrations in order to facilitate the agreement.~~

~~6 Administrations, in determining the distance referred to in § 4 above, are encouraged to exclude those parts of their territory, such as remote small islands, where other services in the band 5 925-6 425 MHz are neither operating nor planned.~~

~~7 If an administration changes its actual or planned deployment of stations in other services, it may require revision of the agreement with the ESV licensing administration(s).~~

~~8 The ESV system should include means of identification and automatic mechanisms to terminate transmissions whenever the station operates outside its authorized geographic (see § 4 above) or operational limits.~~

~~9 ESVs should be equipped so as to enable the licensing administration under the provisions of Article 18 to verify earth station performance and to terminate ESV transmissions immediately upon request by an administration whose services may be affected.~~

~~10 When ESVs operating beyond the territorial waters but within a specified distance (as referred to in § 4 above) fail to comply with the terms required by the concerned administration pursuant to § 2 and 4, then that administration may:~~

- ~~request the ESV to comply with such terms or cease operation immediately; or~~
- ~~request the licensing administration to require such compliance or immediate cessation of the operation.~~

~~11 Any licensing authority that licenses ESVs should maintain at all times a point of contact that may be contacted by a concerned administration.~~

A. Initiation of Contact

When ships equipped with ESVs intend to operate in the band 5 925-6 425 MHz within 300 kilometers and in the band 14-14.5 GHz within 125 km of the baseline (“low water mark” as defined by UNCLOS, 1982) of other administrations having terrestrial stations operating in the same band as the ESV, the ESV licensing administration should contact, in advance of ESV operations within those distances, the concerned administration(s) to obtain agreements that will establish the technical bases for avoiding unacceptable interference to the terrestrial facilities of the concerned administration or administrations.

B. Recommended Actions of Licensing Administrations, ESVs operators and Concerned Administrations:

- Each Administration having terrestrial stations in these bands should have a point of contact for the ESV licensing Administration or the ESV operator to initiate discussions.

- Licensing Administration or the ESV operator should provide the following information:
    1. The technical and operational parameters including the range of its frequency operation;
    2. The proposed dates and ports to be visited and the routes of the ship(s) equipped with ESVs to reach those ports within the minimum distance from the baseline ("low water mark" as defined by UNCLOS, 1982) of the concerned Administration.
- Concerned Administrations that have terrestrial stations that could be affected by ESVs operations should do the following when contacted by the ESV licensing Administration or the ESV operator:
    1. Determine if they have terrestrial stations in the same frequency band as the ESV;
    2. Identify frequencies for ESV use that would avoid the potential for interference.

C. ESV Operating Agreements

A concerned Administration is encouraged to enter into an agreement with the ESV licensing Administration that describes the conditions for operation of the ESV when operating near the coast or in ports of the concerned Administration. These agreements should be concluded prior to the operation of the ESV stations near the coast or in the ports of the concerned Administration. The agreement should consider using the 5 925 – 6 425 MHz band outside certain limits and not using this band inside certain limits in countries that have fixed service stations in the same band and should include the possibility of switching to 14 – 14.5 GHz band if there are no terrestrial services in the band. The operating agreement may be revised at any time at the discretion of the concerned Administration, particularly whenever new terrestrial facilities are authorized that could potentially receive unacceptable interference.

D. Frequency Use Arrangements

National practices, as well as applicable recommendations of the ITU-R, may be used in reaching bilateral or multilateral frequency usage arrangements. Typical characteristics for ESV operations are contained in Annex 2.

E. Protection from Transmissions of Other Services

ESVs are not protected from the transmissions of other services operating in the 4 GHz and 11/12 GHz bands.

F. ESV Point of Contact

Each ESV operator should provide a point of contact to the Administration with which agreements have been reached for the purpose of reporting unacceptable interference caused by an ESV.

G. Avoidance of Unacceptable Interference

The ESV licensing Administration shall ensure that such stations do not cause unacceptable interference to the services of other concerned Administrations. In the event that unacceptable interference occurs, the ESV operator must eliminate the source of any interference from its station immediately upon being advised of such interference. Additionally, the ESV operator must immediately terminate transmissions at the request of either the concerned Administration or the ESV

licensing Administration if either Administration determines that the ESV is causing unacceptable interference or is otherwise not being operated in compliance with the operating agreement.

Additionally, ESVs stations should have the following operational capabilities:

1. The ESV system should include a means of identification and location, and automatic mechanisms to terminate transmissions whenever the station operates outside its authorized geographic area (see resolves 2 or operational limits).

2. The ESV system should be equipped so as to enable the ESV licensing Administration under the provisions of Article 18 to verify earth station performance and to terminate ESV transmissions immediately upon request by a concerned Administration whose services may be affected.

Reasons: Provide protection to existing radio services, provide administrations operating systems in existing radio services with guidance on how to reach agreement with operators of ESV systems and provide administrations with the means to operate ESVs in the bands identified.

USA/ /7 MOD

ANNEX 2 TO RESOLUTION 82 (WRC-~~200~~03)

~~Provisional technical guidelines applicable to ESVs operating in the bands 3 700-4 200 MHz and 5 925-6 425 MHz~~

This annex contains typical characteristics of ESV earth stations on board vessels for the 5 925-6 425 MHz and 14-14.5 GHz bands.

5 925-6 425 MHz	
Minimum diameter of ESV antenna:	2.4 m
~~Maximum half-power beamwidth of ESV antenna:~~	~~1.5º~~
~~Minimum elevation angle of ESV antenna:~~	~~10º~~
Maximum necessary bandwidth per vessel:	2.~~346~~ MHz
~~Maximum necessary bandwidth in a single operating area:~~	~~36 MHz (see Note)~~
Maximum ESV transmitter power spectral density at the input to the antenna:	17dB(W/MHz)
~~Tracking accuracy of ESV antenna:~~	~~0.2º~~
14-14.5 GHz	
Minimum diameter of ESV antenna:	1.2 m
Maximum necessary bandwidth per vessel:	2.4 MHz
Maximum ESV transmitter power spectral density at the input to the antenna:	12.5 dB(W/MHz)

~~NOTE – The actual bandwidth required in an operating area will depend on the number of ESVs that would be present simultaneously in that area, and in many areas the required bandwidth will be less than 36 MHz. In addition, because ESVs are frequency agile, the necessary bandwidth per vessel (2.346 MHz) can be generally identified anywhere within the 4/6 GHz bands and does not have to be contiguous with bandwidth of other ESVs.~~

Reasons: This annex is consistent with the ITU-R Study Group 4 Recommendation on ESV characteristics.

USA/ /8 ADD

5.ESV1 For earth stations on board vessels (see 1.68 bis) operating in the 5 925-6 425 MHz and 14.0-14.5 GHz bands, at any angle φ specified below, off the main-lobe axis of an earth-station antenna, the maximum e.i.r.p. in any direction within 3° of the GSO shall not exceed the following values:

5925-6425 MHz

Angle off-axis	*Maximum e.i.r.p. per 4 kHz band*
$2.5° \le \varphi \le 7°$	$(32 - 25 \log \varphi)$ dB(W/4 kHz)
$7° < \varphi \le 9.2°$	11dB(W/4 kHz)
$9.2° < \varphi \le 48°$	$(35 - 25 \log \varphi)$ dB(W/4 kHz)
$48° < \varphi \le 180°$	– 7 dB(W/4 kHz)

14.0-14.5 GHz

Angle off-axis	*Maximum e.i.r.p. in any 40 kHz band*
$2° \le \varphi \le 7°$	$33 - 25 \log \varphi$ dBW
$7° < \varphi \le 9.2°$	12 dBW
$9.2° < \varphi \le 48°$	$36 - 25 \log \varphi$ dBW
$\varphi > 48°$	– 6 dBW

Coordination agreements between fixed-satellite service networks under Article **9** may result in lower off-axis e.i.r.p. levels.

Reasons: In order to ensure that the off axis e.i.r.p. performance of ESVs operating in FSS networks is consistent with that of earth stations already operating in these networks in these bands, and to ensure efficient use of the GSO.